

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
NON-PROVISIONAL PATENT APPLICATION

Title: Aerodynamic profile

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CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the priority date of Spanish Patent P200301012 filed on April 16, 2003. The basis for priority in this case is the Paris Convention for the Protection of Industrial Property (613 O.G. 23,53 Stat 1748). The Spanish patent application was filed in The Official Patent and Trademarks Office of Spain.

FIELD OF THE INVENTION.

In all types of vehicles and their external elements such as wings, fuselages, horizontal and vertical stabilizers, engines, etc. of the aircraft.

STATE OF THE PRIOR ART.

Existing aerodynamic profiles have a transversal cross-section with a rounded leading edge which is partially elliptical or oval, with the trailing edge in a very acute dihedral angle, the upper surface being convex and the lower

surface substantially flat, and with a relatively low lift/drag ratio. Such aerodynamic profiles produce lift as a function of the pressure differences generated between the upper and lower surfaces, which are negative on the upper surface and positive on the lower surface.

#### DESCRIPTION OF THE INVENTION.

The aerodynamic profile of the invention consists of two zones or main sections. One is the front surface inclined with a positive angle, generating the totality or greater part of the lift, and the other is the rear portion or zone to the front surface, profiled or streamlined, formed by two curved, generally hollow surfaces which do not generate lift, but lead the air flow, properly reducing drag and avoiding boundary layer separation. The aerodynamic profile of the invention can be considered like an inclined plate whose rear surface is streamlined, taking advantage of its lifting frontal characteristics and eliminating the drawback or disadvantages such as drag or boundary layer separation of the rear zone of the plate.

The aerodynamic profile produces a great lift with minimum drag providing maximum efficiency and effectiveness, with the separation between the two surfaces of the rear portion determining its efficiency. There is no depression in the

upper surface, which prevents the occurrence of boundary layer separation, eliminating the difficulty resulting from great angles of attack of the existing wings.

The inclined front surface can be flat, concave or convex.

The nose or leading edge upper zone can be slightly curved.

The nose or leading edge can be rounded, allowing greater angles of attack.

The rear portion can have its lower surface flat, horizontal and rigid, in this case said zone will produce lift due to its downward inclination. It can have also different intermediate inclinations from the later portion between this last inclination and the horizontal.

The periphery of the front surface can display a small flange except in its lower zone, which projects and avoids the slip of the air, and with whose flow is aligned, which is specially useful with profiles arranged longitudinally.

The front surface can be circular, oval or rectangular with its corners rounded, and when they are longitudinal elements, they can be arranged laterally, vertical or inclined. In all the cases its efficiency is the same.

The rear portion can be rigid, can be total or partially free and rotary and can also be driven by means of a ram. It can have flexible walls or it can be formed by two flexible

plates which slide between themselves in the trailing edge, in which they adapt to the airflow independently of the angle of attack applied.

It is useful for all type of vehicles and their external elements such as wings, fuselages, horizontal and vertical stabilizers, engines, etc. of the aircraft.

Unlike the existing wings, this profile produces great lift with zero angle of attack and without separation of the boundary layer. In an aircraft, it can be enough with narrow and transversally lengthened stabilizing wings.

Advantages: It is simple and inexpensive, it can completely eliminate or significantly reduce the disadvantages resulting from wing use, the boundary layer separation is eliminated or minimized, and it has high efficiency and saves fuel. In addition, the lift/drag rate is very large and it allows greater angles of attack of the front surface.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a schematic and cross-section view of the profile of the invention.

Figure 2 shows a perspective view of a variant of a profile.

Figure 3 shows a schematic and cross-section view of a variant of the profile of the invention.

Figure 4 shows a schematic and cross-section view of a variant of the profile of the invention.

Figure 5 shows a schematic and cross-section view of a variant of the profile of the invention.

Figure 6 shows a schematic front and partial view of a variant of the profile of the invention.

Figure 7 shows a schematic front view of a variant of the profile of the invention.

Figure 8 shows a schematic front and partial view of a variant of the profile of the invention.

#### MORE DETAILED DESCRIPTION OF THE INVENTION

Figure 1 consists of the front surface inclined with a positive angle (1), generating of the totality or greater part of the lift, the rear portion (2) to the front surface, formed by the two surfaces, the upper (5) and the lower (6), profiled or streamlined, formed by two curve surfaces, which does not generate lift, but leads the air flow properly reducing drag and avoiding that the boundary layer separation takes place. The flow and the arrows show the displacement backwards and downward of the streamlines and as a result the forces generated on the fuselage, where L is the lift and D the drag. The leading edge or nose (3), the trailing edge or tail (4). It is an arrangement with an angle of attack zero.

Figure 2 consists of the front surface curved and inclined of circular cross-section type with a positive angle of attack (1), generating of the totality or greater part of the lift, the rear portion to the front surface (2) in this case of conical form with its generatrices curved and convex and the flange (7).

Figure 3 consists of the inclined front surface, curved and with a positive angle (1), the rear portion to the front surface (2) formed by two sliding plates flexible plates which slide between themselves (4 and 4') in the trailing edge and the nose or round leading edge (8).

Figure 4 consists of the inclined front surface (1), the rear portion to the frontal surface (2) and the curve upper zone of the nose or leading edge (9).

Figure 5 consists of the inclined front surface (1), the rear portion to the frontal surface (2) rotary around the axis (10) and the upper zone of the curved leading edge (9).

Figure 6 shows the front zone of a portion of a wing of the horizontal form.

Figure 7 shows the front zone of a profile of oval and horizontal form.

Figure 8 shows the front zone of a profile of the rectangular and vertical form with rounded corners.